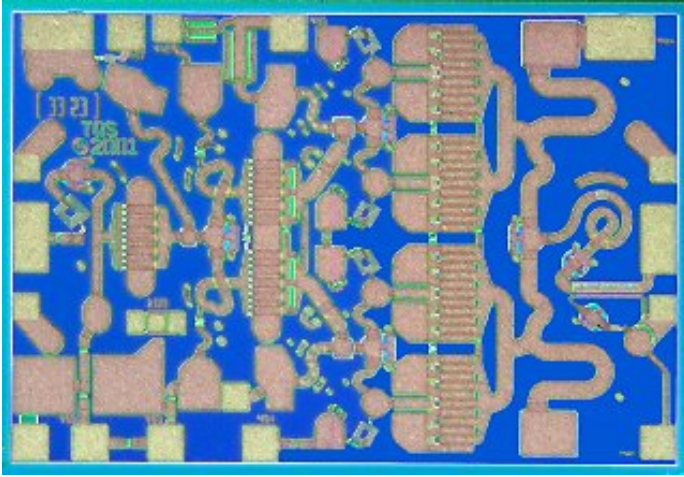


**Ku Band, 2 Watt Power Amplifier**

**TGA2510**

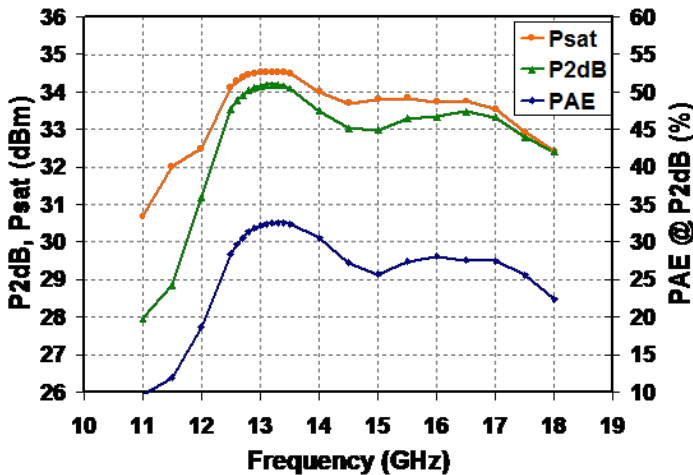
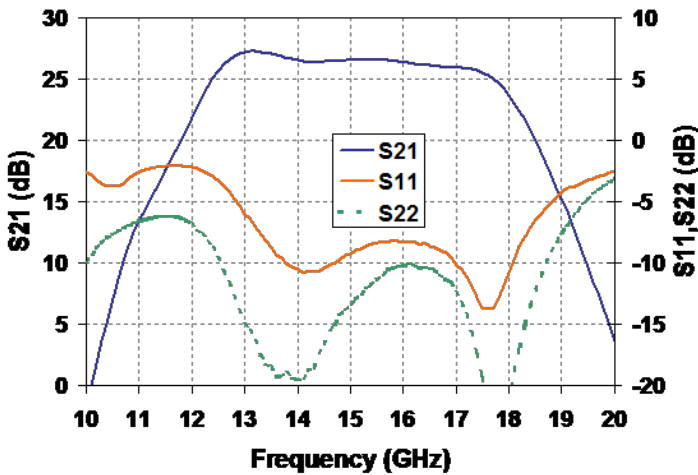


**Key Features and Performance**

- 34 dBm Midband Psat
- 26 dB Nominal Gain
- 7 dB Typical Input Return Loss
- 12 dB Typical Output Return Loss
- 12.5 - 17 GHz Frequency Range
- Directional Power Detector with Reference
- 0.25µm pHEMT 3MI Technology
- Bias Conditions: 7.5V, 650mA
- Chip Dimensions:  
2.02 x 1.38 x 0.10 mm  
(0.080 x 0.054 x 0.004 inches)

**Preliminary Measured Performance**

Bias Conditions: Vd=7.5V Id=650mA



Note: Datasheet is subject to change without notice.

**Primary Applications**

- VSAT
- Point to Point

**TABLE I**  
**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Notes
V <sub>D</sub>	Drain Voltage	8 V	<u>1/</u> <u>2/</u>
V <sub>G</sub>	Gate Voltage Range	-5V to 0V	<u>1/</u>
I <sub>D</sub>	Drain Supply Current	1300 mA	<u>1/</u> <u>2/</u>
I <sub>G</sub>	Gate Supply Current	18 mA	<u>1/</u>
P <sub>IN</sub>	Input Continuous Wave Power	24 dBm	<u>1/</u> <u>2/</u>
P <sub>D</sub>	Power Dissipation	10.4 W	<u>1/</u> <u>2/</u>
T <sub>CH</sub>	Operating Channel Temperature	200 °C	<u>3/</u>
T <sub>M</sub>	Mounting Temperature (30 Seconds)	320 °C	
T <sub>STG</sub>	Storage Temperature	-65 to 150 °C	

- 1/ These ratings represent the maximum operable values for this device
- 2/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P<sub>D</sub> at a package base temperature of 70°C
- 3/ Junction operating temperature will directly affect the device median lifetime. For maximum life, it is recommended that channel temperatures be maintained at the lowest possible levels.

**TABLE II**  
**RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Value
V <sub>d</sub>	Drain Voltage	7.5 V
I <sub>d</sub>	Drain Current	650 mA
I <sub>d_Drive</sub>	Drain Current under RF Drive	1200 mA
V <sub>g3</sub> , V <sub>g4</sub>	Gate Voltage	-0.65 V typical

**TABLE III**  
**RF CHARACTERIZATION TABLE**  
( $T_A = 25^\circ\text{C}$ , Nominal)  
( $V_d = 7.5\text{V}$ ,  $I_{dq} = 650\text{mA} \pm 5\%$ )

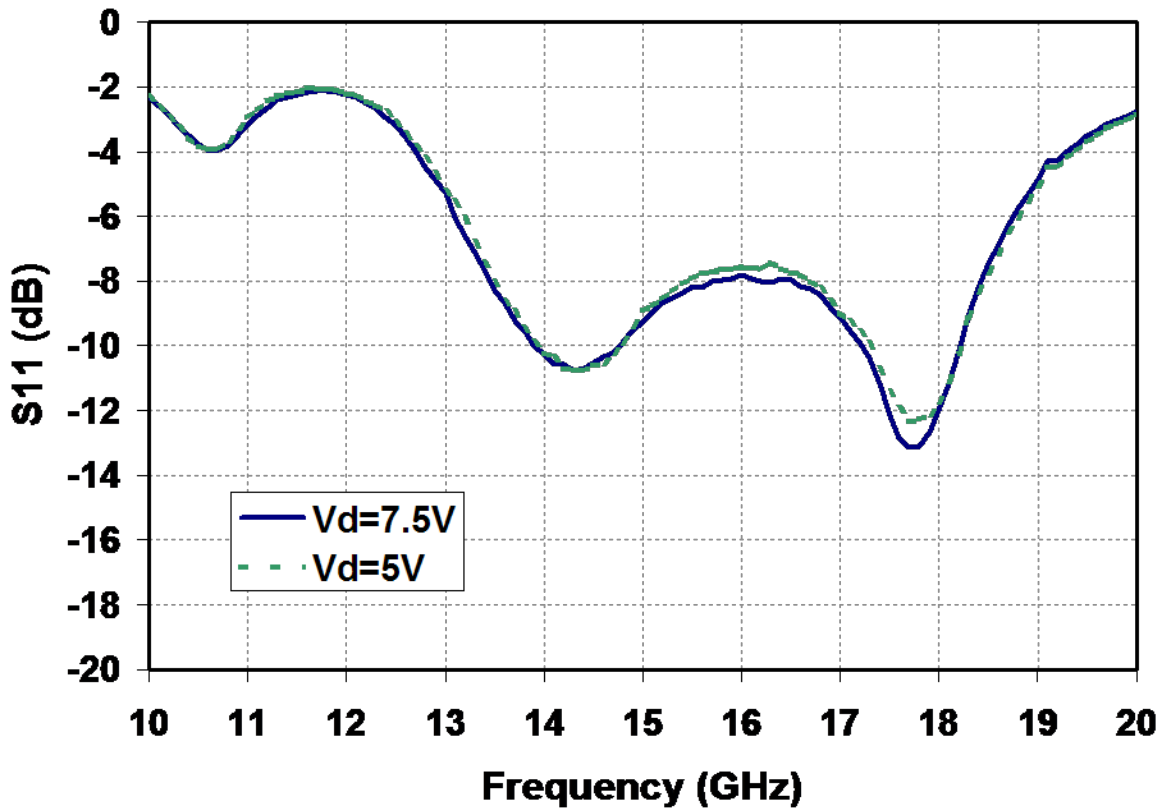
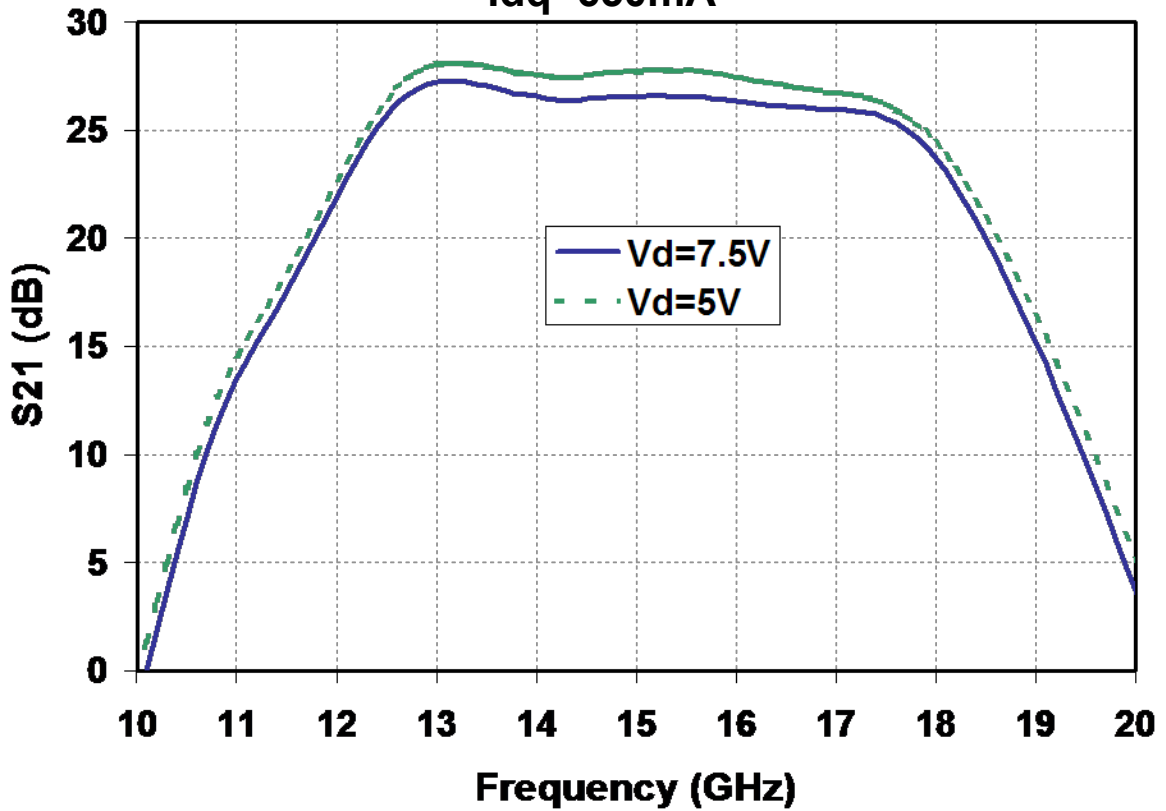
Symbol	Parameter	Test Conditions	Typ	Units	Notes
Gain	Small Signal Gain	F = 12.5 – 17 GHz	26	dB	
IRL	Input Return Loss	F = 12.5 – 17 GHz	7	dB	
ORL	Output Return Loss	F = 12.5 – 17 GHz	12	dB	
PWR	Output Power @ Pin = +15dBm	F = 12.5 – 17 GHz	34.0	dBm	
PAE	Power Added Efficiency @ Pin=+15dBm	F = 12.5 – 17 GHz	31	%	

**TABLE IV**  
**THERMAL INFORMATION**

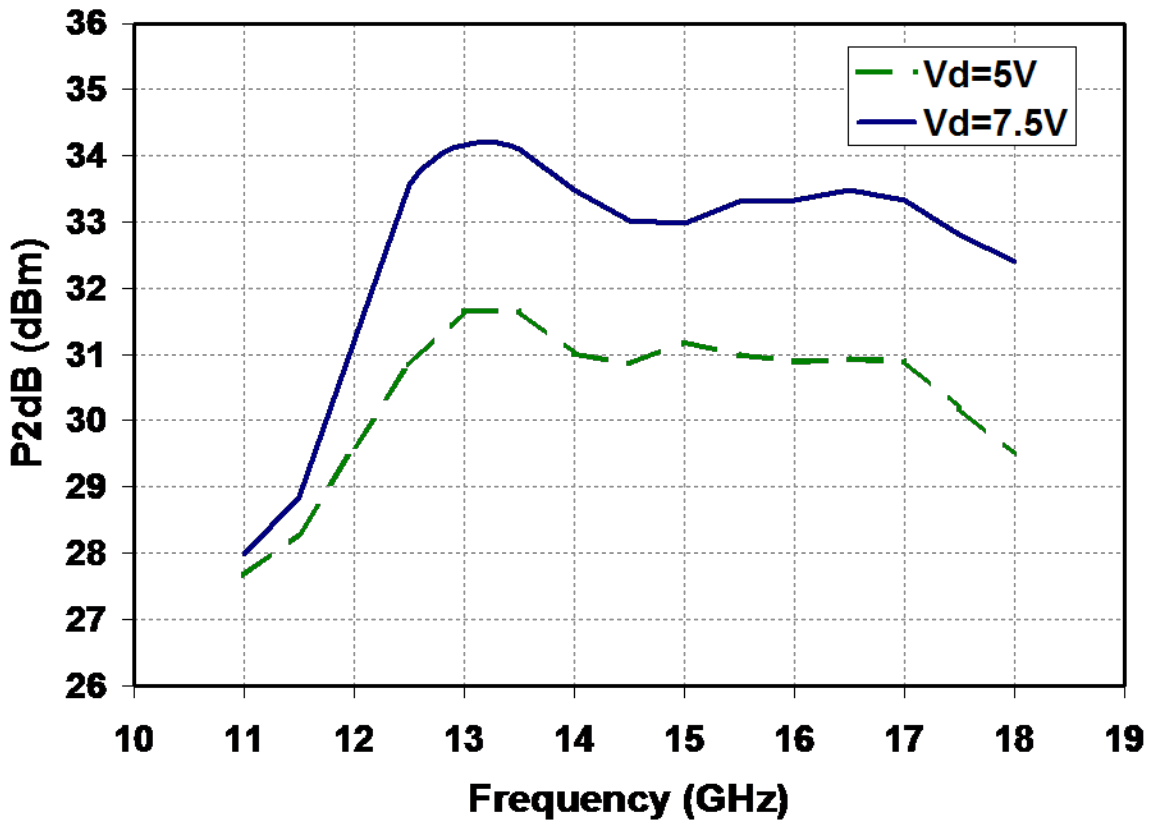
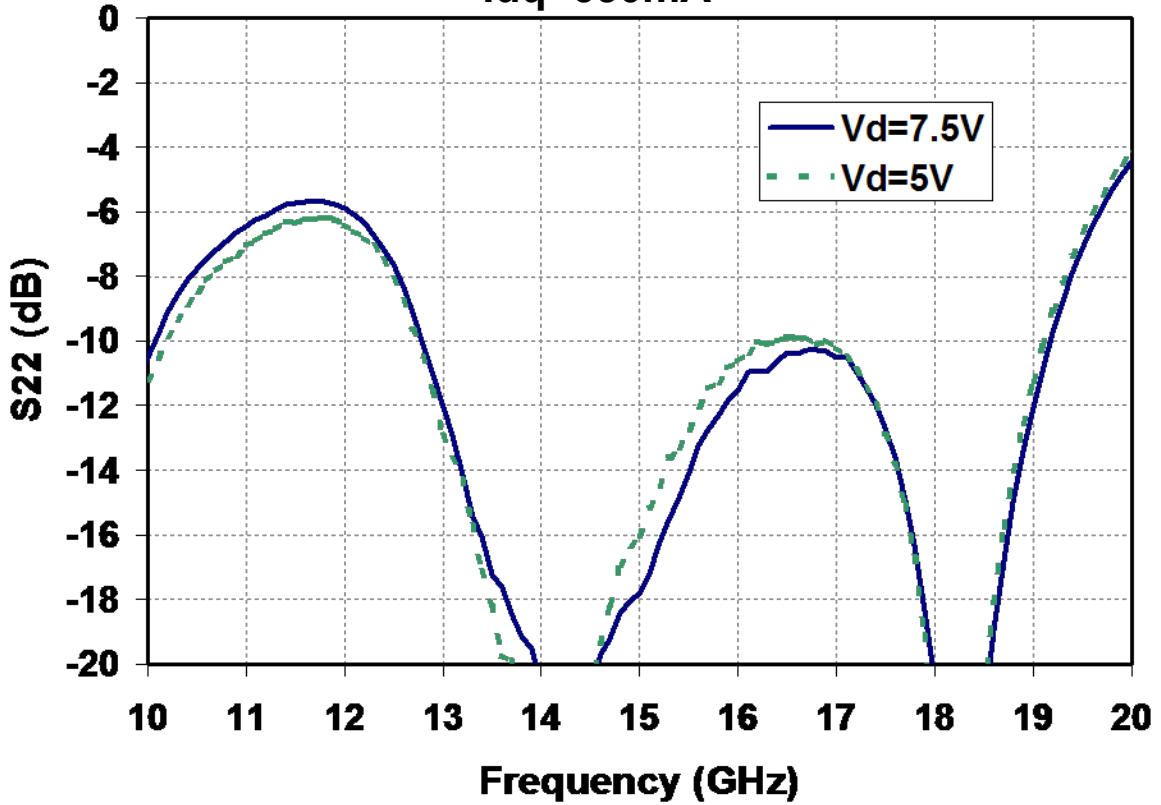
Parameter	Test Conditions	$T_{CH}$ ( $^\circ\text{C}$ )	$\theta_{jc}$ ( $^\circ\text{C}/\text{W}$ )	$T_m$ (hrs)
$\theta_{jc}$ Thermal Resistance (Channel to Backside of Carrier)	$V_D = 7.5\text{V}$ $I_D = 650\text{mA}$ $P_{DISS} = 4.88\text{W}$ $T_{BASE} = 70^\circ\text{C}$	130.7	12.44	5.5E+6

Note: Assumes eutectic attach using 1.5mil 80/20 AuSn mounted to a 20mil CuMo carrier at 70°C baseplate temperature. Worst case conditions with no RF applied, 100% of DC power is dissipated.

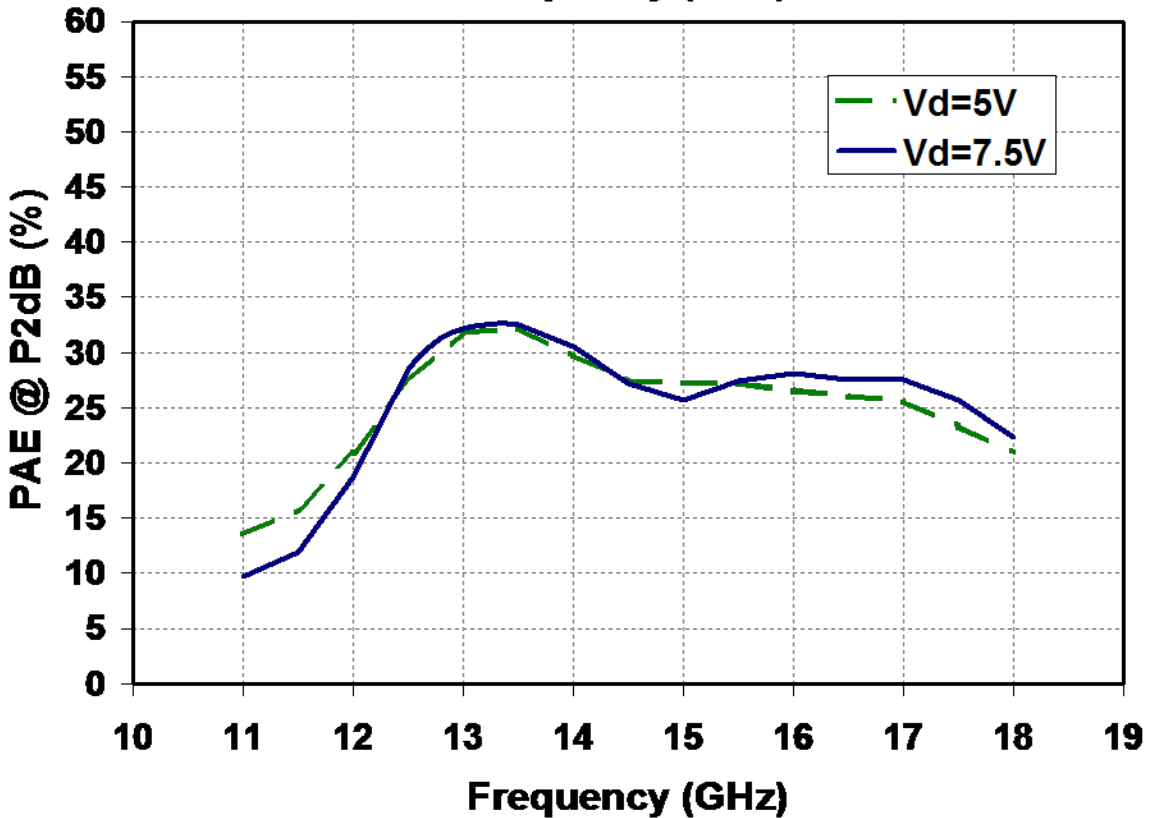
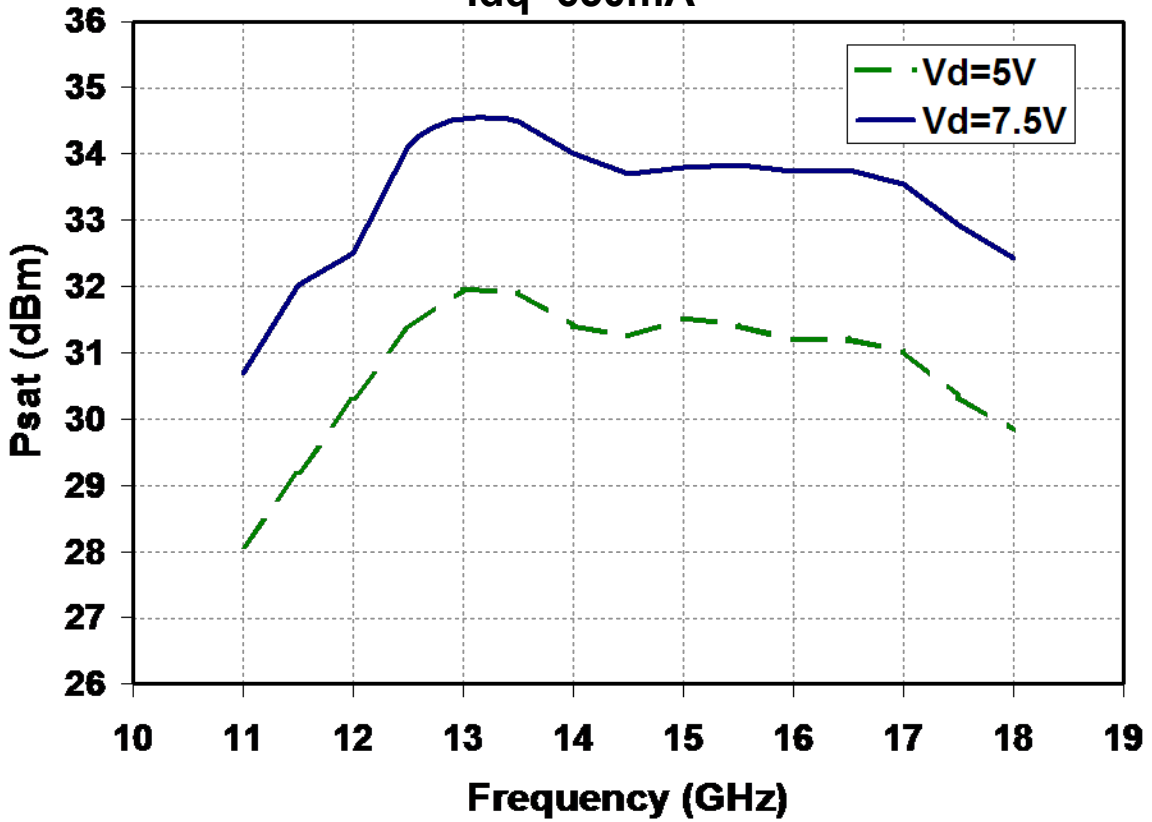
Typical Fixtured Performance  
Idq=650mA



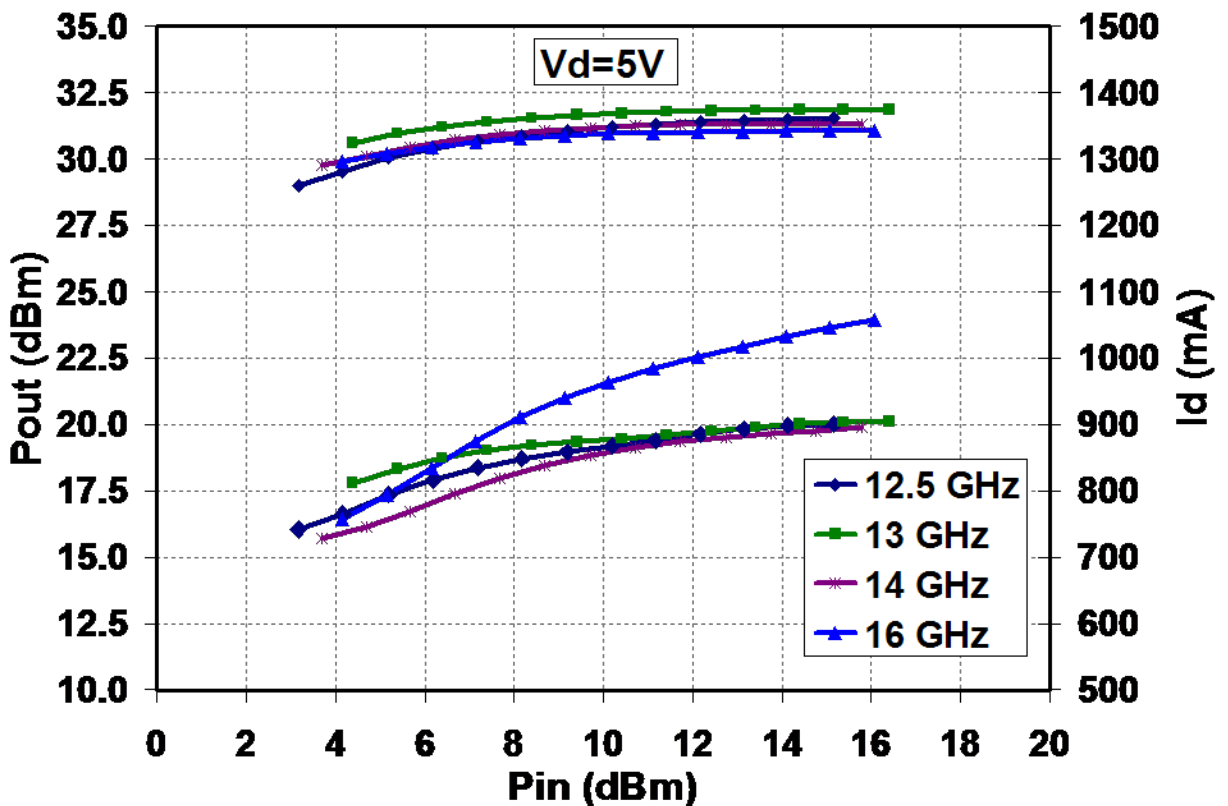
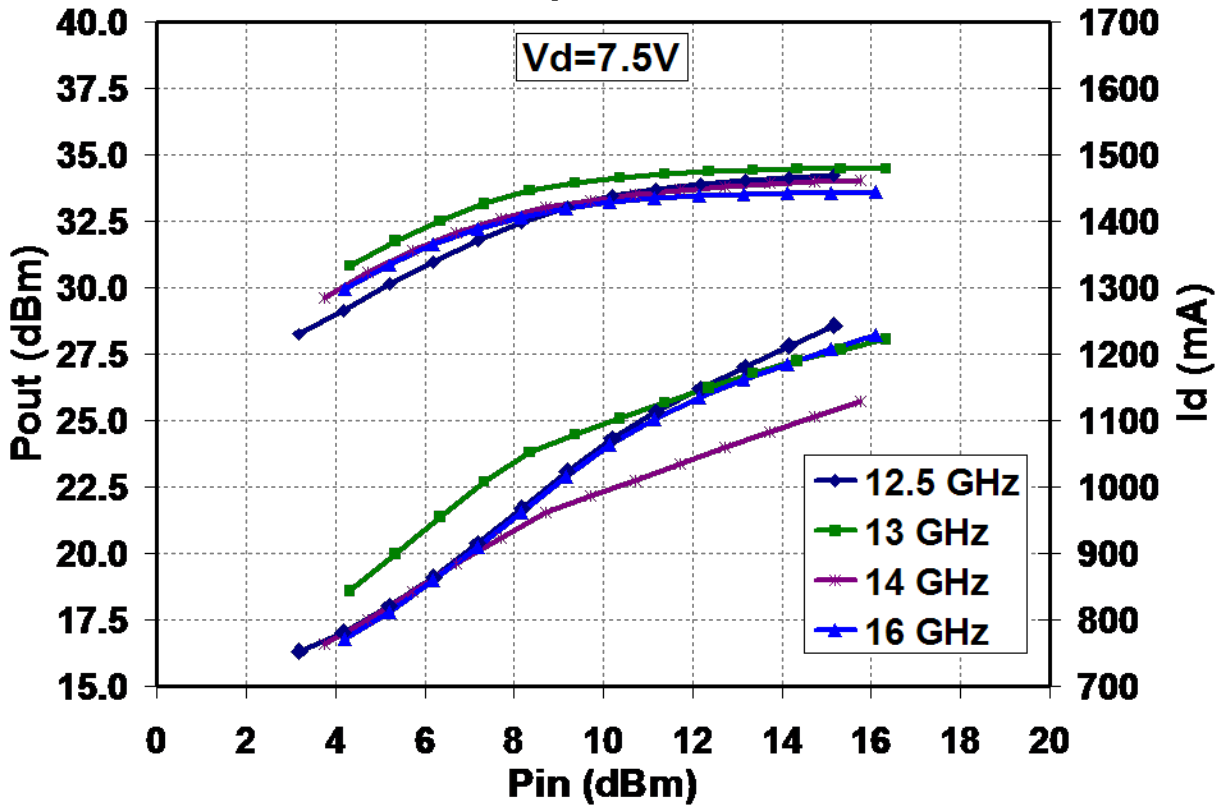
Typical Fixtured Performance  
Idq=650mA



**Typical Fixtured Performance**  
**Idq=650mA**

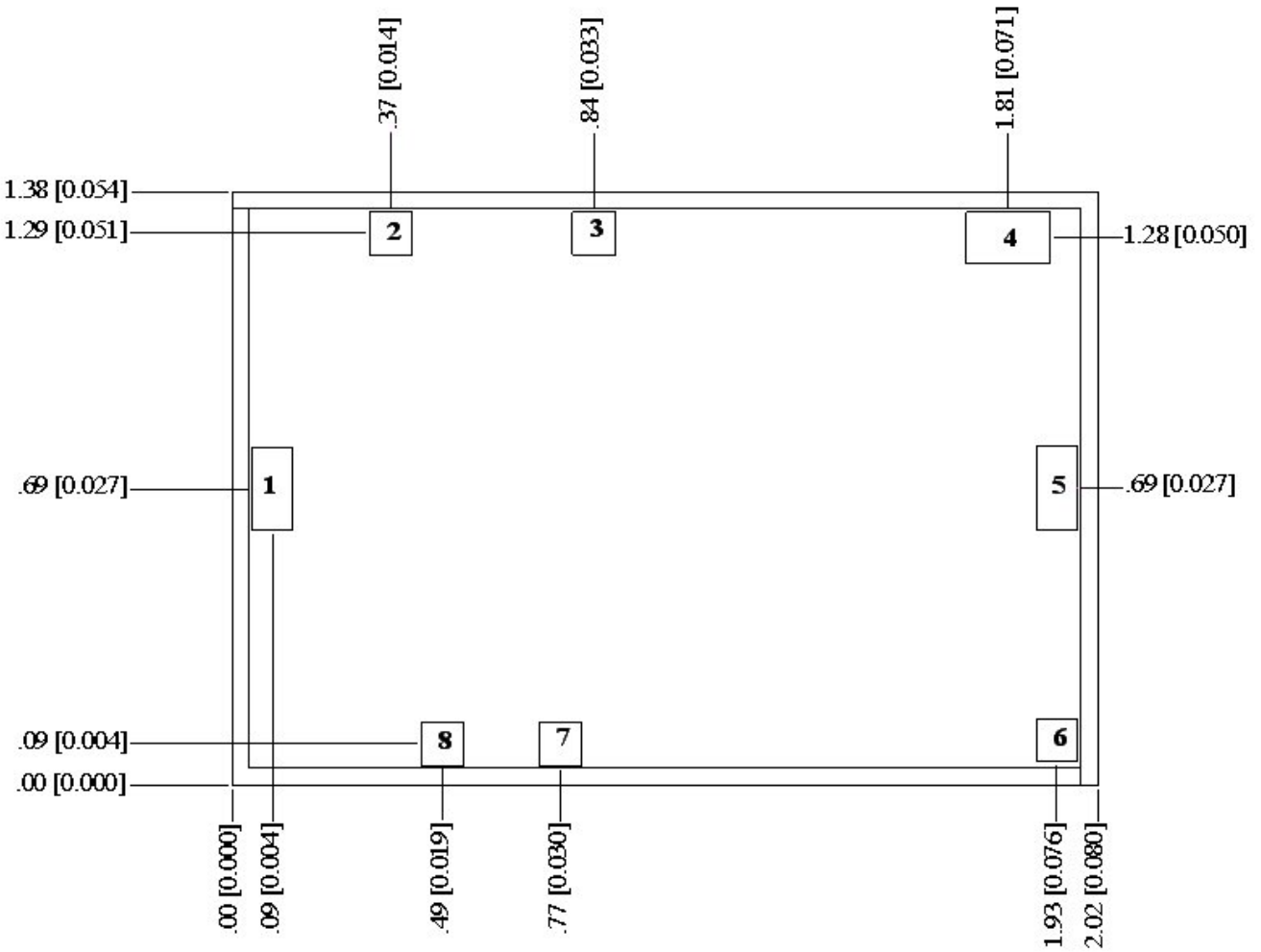


Typical Fixtured Performance  
Idq=650mA



**Mechanical Drawing**

**TGA2510**



Units: millimeters [inches]

Thickness: 0.10 [0.004] (reference only)

Chip edge to bond pad dimensions are shown to center of bond pads.

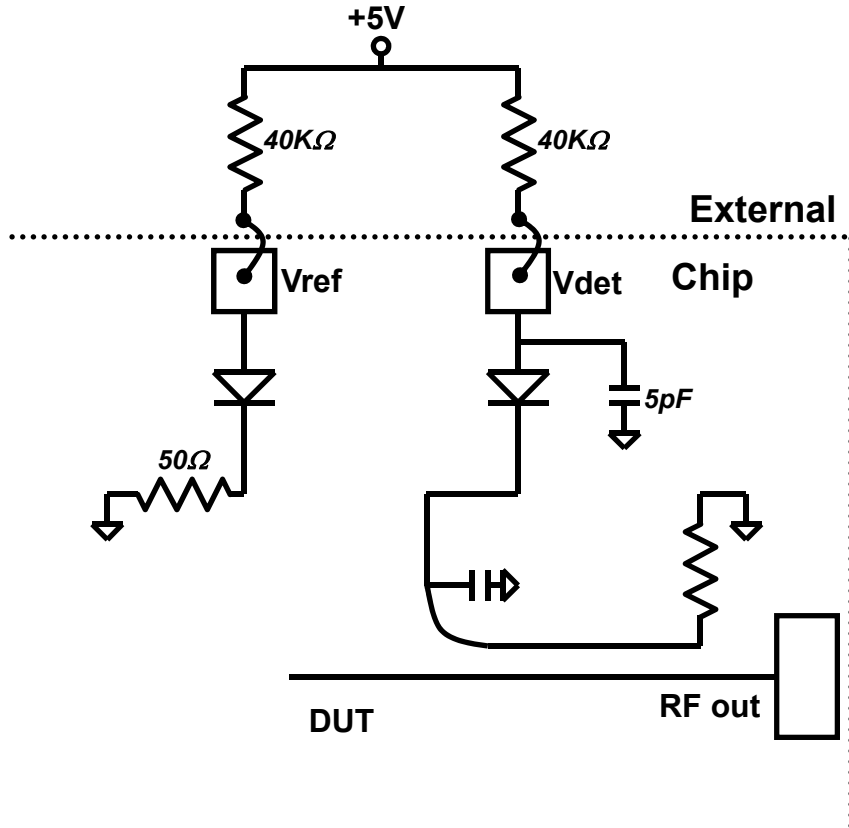
Chip size tolerance:  $\pm 0.05$  [0.002]

RF groundthrough backside

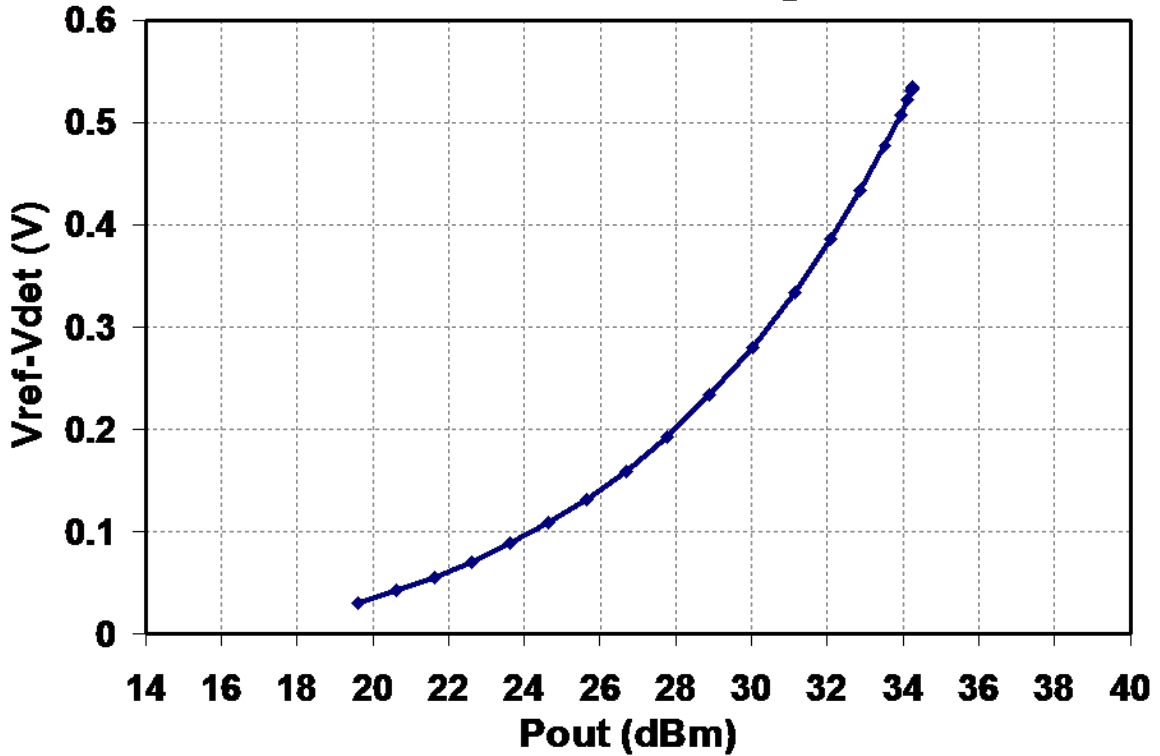
Bond Pad #1	RF Input	0.10 x 0.20	[0.004 x 0.008]
Bond Pad #2	Vref	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #3	Vd3	0.10 x 0.20	[0.004 x 0.008]
Bond Pad #4	Vd4	0.20 x 0.13	[0.008 x 0.005]
Bond Pad #5	RF Output	0.10 x 0.20	[0.004 x 0.008]
Bond Pad #6	Vdet	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #7	Vg4	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #8	Vg3	0.10 x 0.10	[0.004 x 0.004]



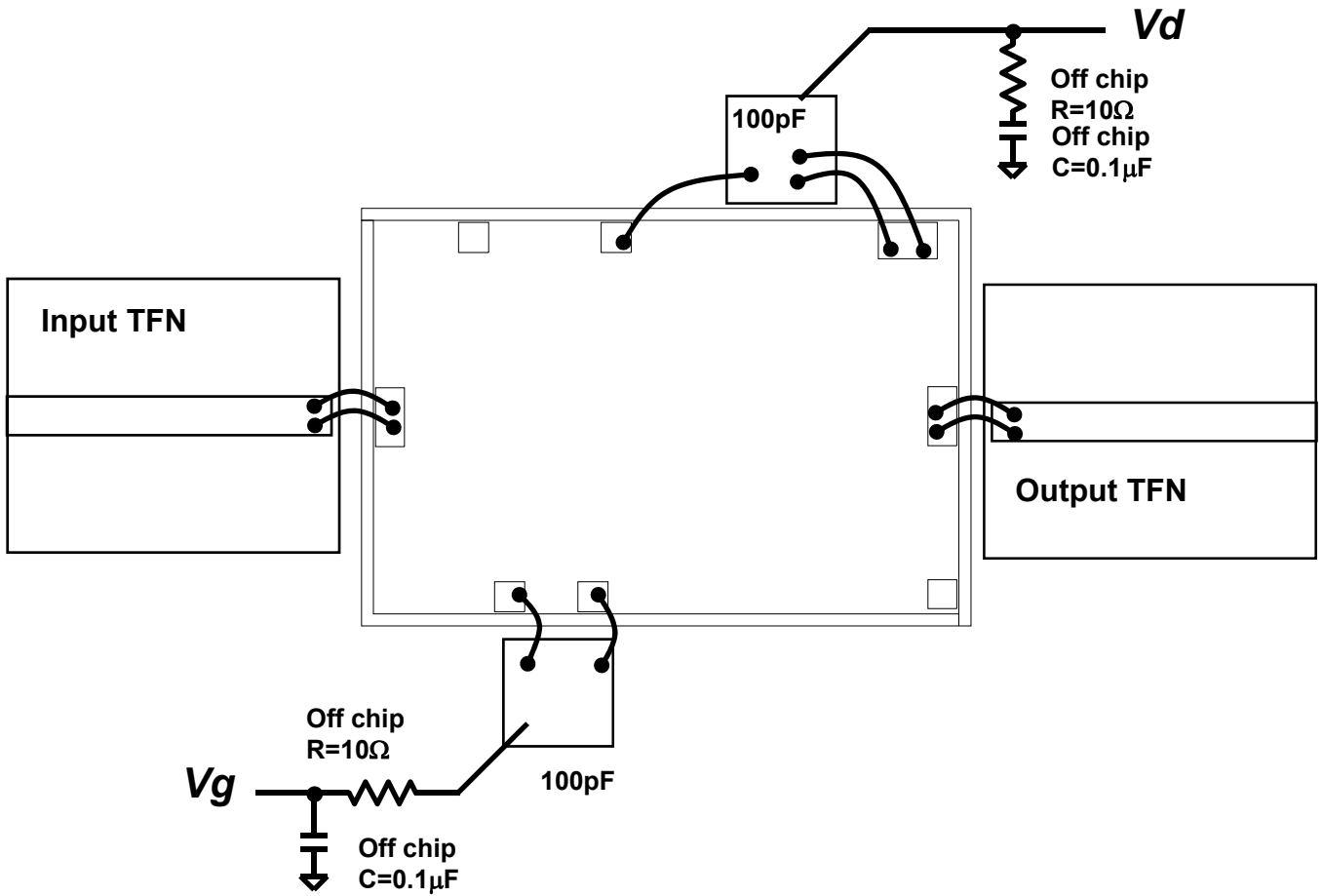
**Power Detector**



**TGA2510 Power Detector @ 14GHz**



## Chip Assembly & Bonding Diagram



*GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.*

## **Assembly Process Notes**

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300°C. (30 seconds maximum)
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- No fluxes should be utilized.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

Component placement and adhesive attachment assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.
- Organic attachment can be used in low-power applications.
- Curing should be done in a convection oven; proper exhaust is a safety concern.
- Microwave or radiant curing should not be used because of differential heating.
- Coefficient of thermal expansion matching is critical.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Maximum stage temperature is 200°C.

***GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.***